

CHARLES LYELL¹

Life, Letters, and Journals of Sir Charles Lyell, Bart., Author of the Principles of Geology, &c. Edited by his Sister-in-law, Mrs. Lyell. In two volumes. With Portraits. (London: John Murray, Albemarle Street, 1881.)

II.

IN our previous notice of this work we have dwelt at some length upon the insight which it affords us concerning the origin and history of the book, which constitutes Lyell's chief title to fame. But the fact must not be lost sight of that, besides writing the "Principles of Geology," Lyell gave to the world a number of other books and original memoirs of the highest scientific value, though their fame has been overshadowed, to some extent, by that of his great work. The "Principles of Geology" was not, as some would have us suppose, a mere compilation from the works of other authors, for in every page of it we find embodied the results arrived at by the author after careful personal observation and close reasoning. Lyell, in a letter addressed to Edward Forbes, in 1846, very properly protests against the idea that original observations and theories are only to be published in journals of science and the proceedings of learned societies. He says:—

"On the Continent I gain no priority for any original views or facts which have only appeared in my 'Principles' and 'Elements.' When the Geological Society of France voted a sum of money to Archaic to draw up a report on the progress of geology for ten years (1835 to 1845, I believe), he wrote to me to say that all treatises on geology were left out of such reports, as they were presumed to be compilations, authors taking care to take date for their discoveries in scientific journals, but as my book was an exception to such rules, he wished me to send him an exact list of all my original theories and facts, and their dates, which, owing to their numerous editions, no one could make out, and which he must neglect without such aid" (vol. ii. p. 107).

Among the new observations and generalisations to which Lyell may justly lay claim, we will here allude to one only. Before the appearance of the "Principles of Geology" no serious attempt had been made to bring into correlation those important deposits which overlie the chalk, which the labours of the Italian and French naturalists had invested with so much interest. William Smith's classification of strata, which had met with very general acceptance, both in England and on the Continent, dealt with the formation from the Carboniferous to the Cretaceous inclusive. But above and below those limits the greatest confusion and doubt existed in connection with all questions of geological classification.

What Sedgwick, Murchison, and Lonsdale did for the pre-Carboniferous rocks, Lyell accomplished single-handed for the post-Cretaceous; and his classification, though the advance of knowledge has necessitated modifications in it, is at the present day universally accepted so far as its main features are concerned. The amount of work undertaken by Lyell in collecting the facts upon which this Tertiary Classification is based was enormous, and is well set forth in the volumes before us (vol. i. pp. 182-319).

Besides the "Principles of Geology" and the expan-

¹ Continued from p. 148.

sions of the last part of that work, published under the successive titles of "The Elements of Geology," "A Manual of Geology," and "The Student's Elements of Geology," Lyell wrote four volumes of "Travels in North America," teeming with original facts and observations, and his "Antiquity of Man," or as the *Saturday Review* called it, "Lyell's Trilogy on the Antiquity of Man, Ice, and Darwin." And in addition to these separate works nearly seventy original memoirs contributed to scientific journals are recorded in the list at the end of the work lying before us, besides reviews, lectures, and addresses.

In obtaining the materials for these multitudinous publications Lyell was a most indefatigable worker. Every year he spent a number of months in travelling over parts of Europe or his own country, examining for himself the districts of which he had to treat in his works. It was very characteristic of Lyell that, though willing to learn from the youngest of his contemporaries, he never took anything on trust where personal examination was possible; and it was rarely indeed that his acute powers of observation and logical mind failed to extend, improve and correct the results attained by previous workers in the same field. He visited North America four times, spending thirteen months on his first tour, and nine months on his second, and subsequently resided for some months at Madeira.

But it is not only on account of the record which they contain of Lyell's own work, that the volumes before us are of such great value. Lyell was an active participator in all the scientific movements of his day, and his account of the meetings of the Geological Society, with its stormy debates, of the Geological Club and its convivial gatherings, of the Royal Society and the British Association, are full of the most lively and interesting details. Concerning a debate at the Geological Society in 1829 he writes to Mantell:—

"The last discharge of Conybeare's artillery, served by the great Oxford engineer against the Fluvialists, as they are pleased to term us, drew upon them on Friday a sharp volley of musketry from all sides, and such a broadside at the *finale* from Sedgwick, as was enough to sink the 'Reliquiæ Diluvianæ' for ever, and make the second volume shy of venturing out to sea. After the memoir on the importance of all rivers which feed the 'main river of an isle,' and the sluggishness of Father Thames himself 'scarce able to move a pin's head,' a notice of Cully, land-surveyor, was read on the prodigious force of a Cheviot stream, 'the College,' which has swept away a bridge and annually buries large tracts under gravel. Buckland then jumped up, like a counsel, said Fitton to me, *who had come down special*."

"After his reiteration of Conybeare's arguments, Fitton made a somewhat laboured speech. I followed, and then Sedgwick, who decided on four or *more* deluges, and said the simultaneousness was disproved for ever, &c., and declared that on the nature of such floods we should at present 'doubt and not dogmatise.' A good meeting" (vol. i. p. 253).

Here is his account of the anniversary meeting of the Geological Society in the same year:—

"Sedgwick quite astonished them, it seems, in the chair at the general meeting, which was very full. Among innumerable good hits, when proposing the toast of the Astronomical Society, and Herschel, their president, he said, alluding to H.'s intended marriage (for he is just about to marry the daughter of a Scotch clergyman),

'May the house of Herschel be perpetuated and, like the Cassinis, be illustrious astronomers for three generations. May all the constellations wait upon him! may Virgo go before, and Gemini follow after!' Poor H., notwithstanding his confusion, got up after a roar of laughter had continued for three minutes, and made a famous speech" (vol. i. 251).

In the whole of these letters of Lyell there is a striking absence of anything like jealousy or ill-nature in his remarks. His judgment concerning his contemporaries, whom he had the greatest facilities for knowing, appears to be remarkably just and such as will, we believe, be endorsed by posterity. Take for example what he says concerning the great rivals Murchison and Sedgwick:—

Murchison "has a little too much of what Mathews used to ridicule in his slang as 'the keep-moving, go-if-it-kill-you' system, and I had to fight sometimes for the sake of geology, as his wife had for her strength, to make him proceed with somewhat less precipitation" (vol. i. p. 107).

"Murchison is one who has worked at science chiefly for the rewards, but not entirely, for if he had had no pleasure in it he would have failed; Sedgwick and Conybeare for the pleasure chiefly. What I shall always cherish, is a love for science, rather than its rewards; but I indulge the hope of profit, as the best earnest of usefulness, and also against its becoming a duty to accept some offer of an uncongenial situation" (vol. i. p. 373).

"Sedgwick asked me to walk home with him. I found a gloom upon him, unusual and marked. I most carefully avoided all allusion to the rejected living, but now when the first excitement of declining the boon is over, and that others have expressed their wonder at it, and that he finds himself left alone with his glory, he is dejected. He told me, Thursday last, that he wished before he left Cambridge, to *do something*. 'Now if I take a living instead of going to Wales, I abandon my professorship, and cannot get out the volume on the primary rocks with Conybeare,' &c. Then he hinted that in a year, when this is done, he may retire on some living, and *marry*. But I know Sedgwick well enough to feel sure that the work won't be done in a year, nor perhaps in two; and then a living, &c., won't be just ready, and he is growing older. He has not the application necessary to make his splendid abilities tell in a work. Besides every one leads him astray. A man should have some severity of character, and be able to refuse invitations, &c. The fact is, to become great in science, a man must be nearly as devoted as a lawyer, and must have more than mere talent" (vol. i. p. 375).

With respect to the unfortunate quarrel between these two pioneers in the study of the older palæozoic rocks, the line which Lyell adopts appears to us to be singularly just and judicious. He could not but see that Sedgwick's wrongs, like his maladies, were to a great extent imaginary, and, doing so, was filled with regret at the folly which made so able a man nurse his mortification and rage till it embittered the whole of his subsequent life. Writing in 1855 Lyell says:—

"In Phillips's new edition of his 'Geology,' just out, he makes the Lingula beds Cambrian, just as I do, which I am glad of, as however Murchison may complain, it is really we that are adhering to the original divisions and names adopted by Murchison and Sedgwick. It would be wrong to give up the term Cambrian just when we are beginning to have a distinct fauna for it, as Salter was the first to show here, and Barrande in Bohemia. Sedgwick's attempt to take the Lower Silurian into his Cambrian is even worse than Murchison claiming all that

is older than the Devonian as appertaining to his Silurian" (vol. ii. p. 205-6).

Lyell had great opportunities of knowing Cuvier, and we cannot refrain from quoting what he tells us about the great naturalist's method of organising his work:—

"I got into Cuvier's *sanctum sanctorum* yesterday, and it is truly characteristic of the man. In every part it displays that extraordinary power of methodising which is the grand secret of the prodigious feats which he performs annually without appearing to give himself the least trouble. But before I introduce you to this study, I should tell you that there is first the Museum of Natural History opposite his house, and admirably arranged by himself, then the Anatomy Museum connected with his dwelling. In the latter is a library disposed in a suite of rooms, each containing works on one subject. There is one where there are all the works on ornithology, in another room all on ichthyology, in another osteology, in another *law* books! &c., &c. When he is engaged in such works as require continual reference to a variety of authors, he has a stove shifted into one of these rooms, in which everything on that subject is systematically arranged, so that in the same work he often takes the round of many apartments. But the ordinary studio contains no bookshelves. It is a longish room comfortably furnished, lighted from above, and furnished with eleven desks to stand to, and two low tables, like a public office for so many clerks. But all is for the one man, who multiplies himself as author, and admitting no one into this room, moves as he finds necessary, or as fancy inclines him, from one occupation to another. Each desk is furnished with a complete establishment of inkstand, pens, &c., pins to pin MSS. together, the works immediately in reading and the MS. in hand, and in shelves behind all the MS. of the same work. There is a separate bell to several desks. The *collaborateurs* are not numerous, but always chosen well. They save him every mechanical labour, find references, &c., are rarely admitted to the study, receive orders, and speak not."

"Brongniart, who, in imitation of Cuvier has many clerks and collaborators, is known to lose more time in organising this auxiliary force than he gains by their work, but this is never the case with Cuvier. When I went to get Mantell's casts I found that the man who made moulds, and the painter of them, had distinct apartments, so that there was no confusion, and the despatch with which all was executed was admirable. It cost Cuvier a word only" (vol. i. p. 249).

Although Lyell devoted all his energies to the advancement of geological science, and, as his letters show, steadfastly refused all honours and engagements which would interfere with the performance of the great tasks he had set before himself, yet he was far from being a recluse or one refusing to take an interest in the affairs of the time. His earliest essays in the *Quarterly* were employed in the advocacy of the importance of giving scientific instruction in schools and universities. In his "Travels in North America" he devoted a chapter to the subject of University Reform, and his remarks produced a great impression at the time, and before the Public Schools Commission he gave important evidence. In the reform of the Royal Society he was one of the most active members, and in many of the great movements of the day we find him playing the part of an earnest and advanced liberal.

On other than scientific subjects we may not stay to speak here, but we cannot refrain from mentioning that Lyell's works on America did much to dispel among the educated classes, on both sides of the Atlantic, the feeling

of irritation which had been aroused by the publication of the caricatures in Dickens' "American Notes" and "Martin Chuzzlewit." Non-scientific readers, too, will find much to interest them in these volumes, in the conversations and anecdotes of such men as Scott, Lockhart, Rogers, Whewell, Babbage, Macaulay, Sidney Smith, Milman, and many other eminent men with whom Lyell was on terms of close intimacy. The literary gossip is indeed scarcely less interesting than the scientific.

Of Lyell's amiable and gentle nature these letters and journals afford abundant and interesting evidence. His correspondence with his wife and sisters, and his little nephew, abound with illustrations of the beautiful traits of his character; and the warmth of his attachment comes out very strikingly in his communications with Mantell, Fleming, Horner, Darwin, and others, with whom he was in constant and friendly intercourse. His greatest weakness was perhaps the excessive caution, sometimes approaching timidity, which is exemplified very strikingly in his correspondence with Darwin and Hooker in vol. ii. pp. 361-366. But it must be remembered that it was this same cautious habit which first enabled him to gain the public ear, when it was but little disposed to attend to the teachings of science, and his reputation for this character gave to his later writings on scientific questions an authority which perhaps no other living writer could command. It was in consequence perhaps of this that Lyell's opinions on the subject of evolution, as stated in the "Antiquity of Man," were received by the public like the summing up of a judge, rather than as the speech of an advocate.

We cannot better conclude this notice of Lyell than by quoting the words of his friend the late Dean Stanley, on the occasion of the funeral sermon in Westminster Abbey:—

"Of him who is thus laid to rest, if of any one of our time, it may be said that he followed truth with a zeal as sanctified as ever fired the soul of a missionary, and with a humility as child-like as ever subdued the mind of a simple scholar. For discovering, confirming, or rectifying his conclusions, there was no journey too distant to undertake. Never did he think of his own fame or name in comparison with the scientific results which he sought to establish. From early youth to extreme old age it was to him a solemn religious duty to be incessantly learning, constantly growing, fearlessly correcting his own mistakes, always ready to receive and reproduce from others that which he had not in himself. Science and religion for him were not only not divorced, but were one and indivisible."

These words were spoken when the grave had but just closed over Lyell's mortal remains, but in the hearts of many who had the happiness of knowing and loving him, his memory will long continue green.

JOHN W. JUDD

OUR BOOK SHELF

A Treatise on the Diseases of the Nervous System. By James Ross, M.D. Two Vols. (London: Churchill and Co., 1881.)

THIS is a complete treatise on Diseases of the Nervous System, illustrated with lithographs, photographs, and many woodcuts, of which the latter have mostly been borrowed from several well-known anatomical and physiological works. The book is in many respects a valuable

one, though in others it is not altogether satisfactory. The author is thoroughly accomplished in all that concerns the anatomy and physiology of the nervous system, and he is evidently fully impressed with the absolute importance of an adequate attention to details of this kind on the part of those who would master or keep themselves abreast of modern knowledge concerning disease of the nervous system. A vast amount of work has been done in strengthening our knowledge in this direction during recent years, and as a consequence in no department of medicine have greater advances in the direction of precision of diagnosis been arrived at. In no other work are these anatomical and physiological data, on which the practitioner must largely depend, so copiously reproduced. In this direction, indeed, there is some redundancy. Some of the chapters (such as Chap. I. of Vol. I.) might with advantage have been omitted altogether from the present work, whilst others (such as Chap. I. of Vol. II.), dealing with the Anatomy and Development of the Spinal Cord, might have been very considerably curtailed. An anatomical treatise is one thing, but a work on a department of practical medicine is another thing altogether, although in it many anatomical references ought to exist. On the physiological and pathological sides, what the author has to say concerning Inhibitory Functions generally, and concerning "Syndesis" (or the pathology of Associated Movements), will be found to be both judicious and more or less original. But in studying the author's account of the special diseases of the nervous system, especially in the light of other previous and fuller disquisitions, one cannot help seeing that much of the work (as in the section on Paralysis of the Facial Nerve, for instance) partakes of the nature of careful compilation, and is defective in evidence that the author himself has had any very large experience of the diseases concerning which he treats. Some of the special diseases are indeed altogether inadequately discussed, considering the style of the work generally. In fine, this treatise, though not without considerable merits, is unequal and in many places over-diffuse in its treatment of different parts of the subject. Greater strength and evidence of a larger practical experience in dealing with the different nervous diseases would have made the book more evenly balanced, and caused the reader to think less of its redundancies. These blemishes might perhaps be rectified in a subsequent edition. At present it is a work which will probably possess more interest for the few who are already conversant with nervous diseases, than for the many medical men and students who desire to make themselves more acquainted with them. To the latter its bulk (about 1600 pages) will probably be alarming. The book ends with that most commendable thing, a good index.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Function of the Ears, or the Perception of Direction

REFERRING to the letter in NATURE (vol. xxv. p. 124) I may add that M. Buhler, our French landscape gardener, judges nicely the direction of sound. Some years ago I requested him to trace a walk across a wood so undergrown with a creeping plant that it was impossible to cross it. Having fixed the entrance and exit by going round the wood, he told my negro servant to answer every call of his by a shout. It just then occurred to me that an experiment might be made; and I ordered the negro (in his own language) not to shout, but to